United States
Department of
Agriculture

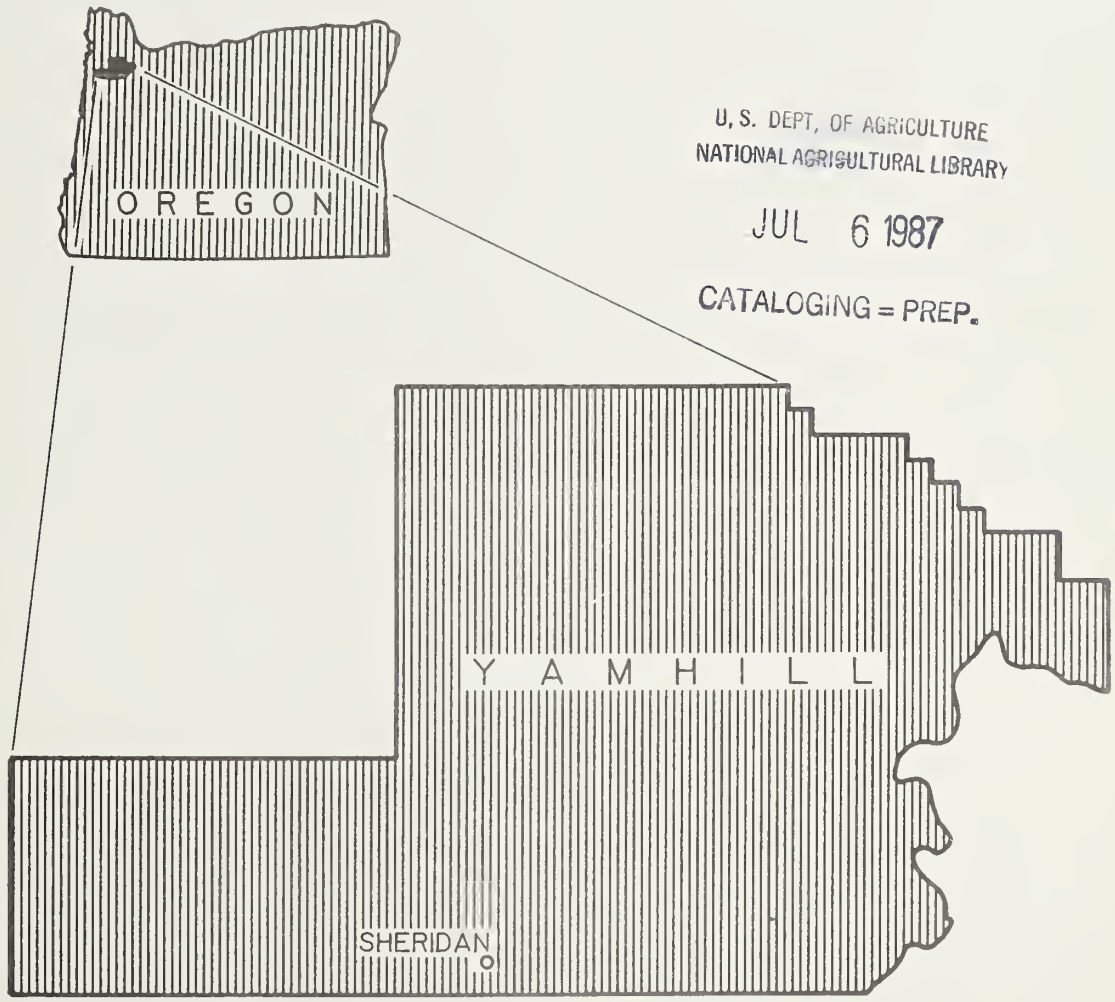
**Soil
Conservation
Service**

Portland,
Oregon

Floodplain Management Study

City of Sheridan
Yamhill County, Oregon

in Cooperation with Yamhill Soil and Water Conservation District, City of Sheridan and the Oregon Department of Water Resources



FLOODPLAIN MANAGEMENT STUDY

CITY OF SHERIDAN

YAMHILL COUNTY, OREGON

USDA - SOIL CONSERVATION SERVICE

PORTLAND, OREGON

in cooperation with

YAMHILL SOIL AND WATER CONSERVATION DISTRICT

OREGON DEPARTMENT OF WATER RESOURCES

CITY OF SHERIDAN

SEPTEMBER 1986

SHERIDAN FLOODPLAIN MANAGEMENT STUDY

FOREWORD

The U. S. Department of Agriculture, Soil Conservation Service, provided assistance to the city of Sheridan and the Yamhill County Soil and Water Conservation District in conducting a floodplain management study in Sheridan.

Approximately 1.3 miles of an unnamed creek in Sheridan were studied to determine present flooding conditions. The hydrologic analyses used watershed flood routing supplemented by existing data from stream gages in the region to develop storm discharges. Hydraulic studies were made to determine the flood elevations for several frequency storms in the portions of the creek studied. The information used in the analyses represent the conditions as they were in 1985.

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CITY OF SHERIDAN
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INTRODUCTION

Local Needs for the Study

The city of Sheridan has experienced frequent floodwater problems on the south side of the city due to a small creek, which drains an area to the southwest. Residential, commercial, school, and industrial areas are affected by this flooding. Also flooded is an area of open land, which is within the city limits and proposed for future industrial sites.

A well managed floodplain can reduce damage to property, reduce mental anxieties, and save lives by controlling the location of property and/or the susceptibility to flooding. Portions of this creek have been cleaned out or enlarged over the past several years.

This study was needed to obtain detailed data on flooding and potential floodplain management alternatives. It will serve as a basis for further floodplain measures and regulations to reduce flood problems.

Yamhill County and the City of Sheridan are involved in the Flood Insurance Program as administered by the Federal Emergency Management Agency (FEMA). The detailed data in this study may be used to revise zones and insurance rates under this program as well as present measures which could reduce floodplain areas.

Study Authority

Floodplain management studies are carried out by the Soil Conservation Service (SCS) as an outgrowth of the recommendations in a report by the Task Force on Federal Flood Control Policy, House Document No. 465 (89th Congress; ordered printed August 10, 1966) especially recommended 9(c), "Regulation of Land Use."

The authority for funding floodplain management studies is Section 6 of Public Law 83-566, the Watershed Protection and Flood Prevention Act. This Act authorized USDA to cooperate with other federal, state, and local agencies to make investigations and surveys of rivers and other waterways as a basis for the development of coordinated programs.

In carrying out floodplain management studies, SCS is also responsive to Executive Order No. 11988, dated May 24, 1977. Section 2(c) of this Order states: "Each agency shall take floodplain management into account when formulating or evaluating any water and land use plans. . . "

Study Purpose and Objectives

The purpose of this study was to develop detailed flood data that can be used by local community officials to reduce flood losses by improved management of the floodplain. Specific study objectives were:

1. Detailed "future without" floodplain maps necessary to enforce and/or propose modification to existing zoning regulations.

2. Detailed information on the elevation at various locations of several flood frequency events, including areas also flooded by the South Yamhill River, and associated damage that might be expected.

3. An array of solutions to the flooding problems and the associated costs of the various alternatives. A discussion of potential USDA programs that could be used to implement solutions.

4. An estimate of damage reduction benefits and approximate location of residual flooded areas under various alternatives. Detailed residual floodplain maps will be prepared for the project solution most likely to be implemented.

5. Information concerning environmental and social concerns in the study area.

6. A draft of the necessary preauthorization planning report for the USDA program which would provide a viable solution.

Study Sponsors

The sponsors are the City of Sheridan, Yamhill County Soil and Water Conservation District, and the Oregon Water Resources Department. At the request of the sponsors, a Plan of Work was prepared for the study and signed in August 1984. Under the provisions of this Plan of Work, SCS did the technical studies and prepared the maps and profiles for this report. The City of Sheridan provided a detailed topographic map of the problem area and other data equivalent to about 30% of the cost.

DESCRIPTION OF AREA

Sheridan is located in the south central portion of Yamhill County. It is part of the Willamette River subregion of the Pacific Northwest Region. It is within the Yamhill River drainage and is part of Watershed Number 1709008-030 as designated on the Oregon Hydrologic Unit map. The tributary included in this study is on the south side of the South Yamhill River and flows through a portion of the city of Sheridan. The headwaters of the creek are in Polk County. The creek flows northeasterly into Sheridan and then easterly to the South Yamhill River. The drainage area of the creek is 2,980 acres, but only 860 acres contribute to the primary area studied. The highest point in the watershed is over 500-foot elevation, and lowest is 160.

Topography in the watershed is rolling in the southwest and relatively flat in the northeast. The study area is in the northeast, flatter portion of the watershed and within the city of Sheridan. Approximately 1.3 miles of channel are in the detailed portion of this study.

DESCRIPTION OF SOILS

The soils discussed for the Sheridan Watershed were determined using the detailed soil maps and map unit descriptions found in the Yamhill County area and Polk County Soil Survey reports. This information provides an overview of the soils and landscapes found within the watershed.

Mapping indicates that about 82% of the area is land with slopes of 0-3%, while 13% is of 3-12%, and only 5% is over 12%. Seventeen soil map units are found within the Sheridan Watershed area. Four of these make up nearly 70% of the area. The four units and the percent of area that they comprise are as follows:

Amity silt loam, 0-2%	18%
Briedwell silt loam, 0-3%	23%
Dayton silt loam, 0-3%	11%
Wapato silty clay loam, 0-3%	15%

The soil maps, soil descriptions, and detailed soil interpretations are included in the Polk County Area and Yamhill County Soil Survey Reports.

The Amity silt loam map unit consists of deep, somewhat poorly drained soils found on nearly level to slightly concave areas on valley terraces. Within the watershed area, this soil is on the terrace above where the Wapato soil is located. These soils formed from mixed silty alluvium. Slopes are 0 to 2 percent.

This soil, when cultivated, is used primarily for small grain, grass seed, hay, and pasture. Drainage is needed for maximum production due to the wetness limitation. Soils of this map unit have major limitations for homesites, commercial buildings, and other community uses because of the seasonal high water table.

The Briedwell silt loam map unit consists of deep, well drained soils found on terraces along the margins of foothills. These soils formed

in old, gravelly alluvium. Within the watershed, this soil is located on the terrace above the Amity and Dayton soils. Slopes are 0 to 3 percent.

The Briedwell soil is used mainly for small grain, grass seed, hay, pasture, and Christmas trees. This soil has few limitations for homesite development.

The Dayton silt loam (thick surface) map unit consists of deep, poorly drained soils that formed in older, mixed alluvium. This soil is located in nearly level to slightly concave areas on broad valley terraces. Within the watershed area, the Dayton soil is associated with Amity and is located on the terrace above the Wapato soil. Slopes are 0 to 2 percent.

This soil is used for grass seed, hay, pasture, and some spring grain. Drainage is needed for maximum production and use due to the wetness limitation. During the winter, water ponds on the soil surface in periods of high precipitation. This soil has severe limitations for community development, including wetness due to a seasonal high water table in winter and spring and a high shrink-swell potential.

The Wapato silty clay loam soil consists of deep, poorly drained soils formed in silty mixed alluvium. This soil is located on bottom land along small streams and in low-lying areas along the larger streams and rivers such as the South Yamhill. Slopes range from 0 to 3 percent.

Most of the acreage has been cleared for cultivation. Small grain, hay, pasture, grass seed, and vegetable crops are the primary crops grown on this soil. Wetness is a limitation to the use of this soil for crops. Drainage is needed if the soil is to be used for maximum production. This soil has major limitations for homesite development and other community uses because of flooding and the seasonal high water table.

Prime farmland soils which occur within the Sheridan Watershed project area include: Amity silt loam (when drained) (0-2%), Bellpine silty clay loam (3-12%), Briedwell silt loam (0-12%), Chehalis silty clay loam (0-3%), Jory silty clay loam (2-12%), McAlpin silty clay loam (0-3%), Santiam silt loam (3-6%), and Wapato silty clay loam (when drained) (0-3%). The land representing these soils within the watershed, about 75% of the area, should be preserved as farmland where the soils occur in economical size farm units.

Hydrologic soil groups are used to estimate runoff from rainfall. The soils are classified into four groups: A, B, C, and D, with group A having the lowest runoff potential and group D having the highest. The hydrologic group classification of the soils in the Sheridan Watershed is estimated as:

Hydrologic Soil Group B	=	29%
Hydrologic Soil Group C	=	19%
Hydrologic Soil Group D	=	52%

NATURAL AND BENEFICIAL VALUES

The natural and beneficial floodplain value in the Sheridan FPMS study area has been altered and modified considerably. The present water course is in a different location from the natural channel. Some riparian vegetation has developed along the new alignment.

The creek flows through farmland and upper portions of the watershed, and in some areas downstream of the study. These areas retain many of the natural values. The creek flows only intermittently, and pollution does not appear to be a problem when these flows occur. There is no fish habitat in the area studied.

Prime farmland soils which occur in sizeable units in the watershed are Amity, Briedwell, McAlpin, and Wapato. The land with these soils should be preserved in farmland, where the soils occur in economical size farm units.

The undisturbed riparian vegetation includes alder, ash, willow, maple, oak, Reed canary grass, cattail, and numerous other species of aquatic vegetation.

Mammalian wildlife species in the watershed include raccoon, skunk, oppossum, gray squirrel, and many kinds of rodents. Avian species include pheasant, California quail, mourning dove, hawk, owl, and numerous species of small birds. There are no threatened and endangered species of animal or plant life in the FPMS area.

FLOOD CONDITIONS

The section of the city of Sheridan in this study has experienced varying degrees of flooding from several storms in the past thirty years. Major floods are usually winter storms, which bring heavy rain to already wet soil. Major storms occurred in the area in December 1955, December 1964, January 1965, January 1972, and January 1974. There is some flooding and ponding in the damage area nearly every year. Several storms have caused flooding around homes and businesses in the city.

The city of Sheridan experiences flooding from the South Yamhill River as well as from the unnamed tributary in this study. Analysis of the topographic maps from the FEMA Study indicates that the slightly raised road bed acts as a divider between the floodwaters of the two streams for storms up to a 50-year flood. On the average, there would be one or two storms in a one hundred-year period which would flood over the railroad. The 100-year flood would overtop the railroad by 0.2 to 0.9 feet. This would not affect the present condition flood levels on the south side of the railroad. Storms greater than the 100-year frequency could overtop the railroad from either side.

A 100-year, or one percent chance, storm would flood about 80 acres in the area studied. Channel velocity for this storm is about 2 feet per second. The average depth of overbank flooding is about one-half foot. The area flooded is shown on the maps, Figures 1A and 1B.

Flooding, as discussed in this report, reflects the conditions of the channel in 1985. Heavy growth of annual grasses and shrubs with some brush was the predominant channel condition. Changes to these conditions, either to heavy brush or to a better cleaned and maintained channel, could change the flooding situation. Frequency and depth of flooding would also be affected.

Bridges and culverts can become greater obstructions to flow by collecting debris and temporarily raising water levels. The potential for, and results of, debris dam formation at culverts was not addressed in this study. The possibility of debris accumulation should be considered in siting new buildings and in design of new culverts. A scheduled channel maintenance program would reduce the chances for debris problems.

Two of the three culverts within the study area are overtopped by all storms over a 5-year frequency. The third, at State Route 18, will be overtopped by storms larger than the 100-year flood. Flooding at Bridge Street causes water to flow through yards, in streets, and into homes and businesses. Flood depths are less than one foot. The third bridge at a county road causes flooding of the road and adjacent agricultural land.

The area flooded in the city of Sheridan includes residential, commercial, and industrial property. Flooding in this area affects residences, commercial buildings, two industrial buildings, and the high school. Water floods against the Southern Pacific Railroad track bed and would overtop it in extreme storms. Most of the buildings in the area do not have basements and are raised up so that floodwaters isolate buildings, but may damage grounds.

An area of about 30 acres, which is periodically cropped, is flooded, but is a potential industrial and residential development area.

A damage survey was done by the local steering committee to determine what damages incurred from recent floods.

Little change in land use within the upper watershed is expected in the future, and therefore, no significant change in the runoff conditions of this area is predicted. Industrial or residential development of the open area within the flooded area could affect the peak flows and duration of high flows below this area and should be considered in planning.

Future improvements to channels and culverts will need to consider potential overflow from the South Yamhill River if designed for more than the 50-year flood. This consideration could include providing added storm drain along the railroad to the new channel or a low dike next to the railroad. In an emergency situation, sand bags could be used to provide a temporary dike.

AREA FLOODED - 100 YEAR STORM
EAST OF BRIDGE STREET

CITY OF SHERIDAN

Contour Interval = 2'

Compiled by photogrammetric methods.
from aerial photos dated March 7, 1985.

Horizontal Datum: Assumed
Vertical Datum: 1947adj. Corps of Engineers BM G168

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FIGURE 1A

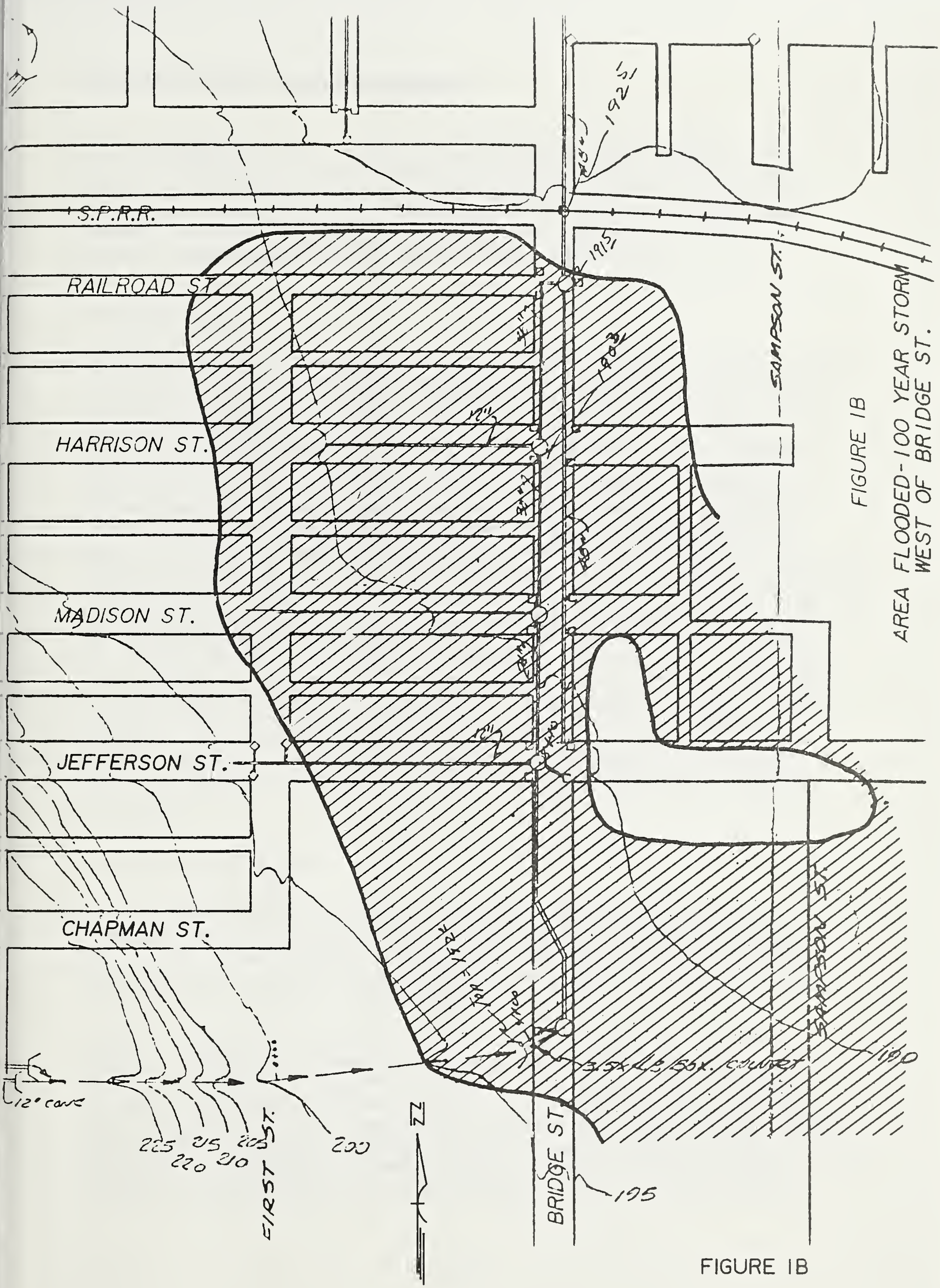

S.P.R.R.
RAILROAD ST.
HARRISON ST.
MADISON ST.
JEFFERSON ST.
CHAPMAN ST.
FIRST ST.
BRIDGE ST.
SAMPSON ST.
SAMPSON ST.
AREA FLOODED-100 YEAR STORM
WEST OF BRIDGE ST.
FIGURE IB
225
220
215
210
205
200
195
190

FIGURE IB

ALTERNATIVES FOR FLOODPLAIN MANAGEMENT

Proper management of the floodplain can minimize flood damage losses in most flood hazard areas. Several management alternatives are available that could be used by local government and individual landowners to improve management of the floodplain. This section discusses those alternatives on a conceptual basis and summarizes the potential for reducing flood damages in the Sheridan flood hazard area.

Existing Measures

Existing floodplain management measures include enrollment in the National Flood Insurance Program (NFIP) and individual efforts by a few landowners at periodic cleanout of channel segments. The NFIP provides for regulation of development within the 100-year floodplain which includes: prohibiting development within the floodway that would cause significant rise of the flood level, maintaining floor levels of new residential structures above the base flood level (within the 100-year floodplain but outside the floodway), anchoring new mobile homes to eliminate flotation, and other controls of development. Federal requirements are considered minimal; more stringent regulations may be enforced locally. The local jurisdiction is the regulatory body. Flood insurance is required for any federally-backed loans on structures within the 100-year floodplain. In order to establish sound building codes and management regulations, the hydraulic charactertistics of the flood hazard area must be known. This study provides the hydraulic information for this creek. Enrollment in the Regular Flood Insurance Program makes it possible for floodplain residents to be partially reimbursed for flood losses sustained. Channel cleanout helps to maintain the capacity of the channel and protects properties from smaller storms. A scheduled periodic maintenance would keep the channel operating efficiently. Present trends in floodplain use would indicate a gradual encroachment of residential and commercial development.

Critical Area Treatment

Critical area treatment consists of applying conservation practices to bare or poorly-vegetated areas to reduce runoff, erosion, and sedimentation of stream channels. Vegetation reduces erosion and sediment caused by runoff, protects the soil from the impact of raindrops, and the root system binds the soil together.

Streambank erosion is occurring at a few points along the tributaries studied. Removal of protective cover and encroachment upon the channel increase the potential for this erosion. With critical area treatment applied, the average runoff would be reduced a small amount. Critical area treatment, by itself, would have a low potential for reducing flood damages in the Sheridan flood hazard area. However, critical area treatment would reduce erosion and sediment. This would reduce the buildup of sediment in the streams and have a beneficial effect on water quality.

Nonstructural Measures

Nonstructural measures are flood-protection techniques, normally applied to individual buildings, that differ from the conventional flood-protection methods such as dams, dikes, and channel work generally used to protect groups of buildings. Nonstructural measures include the following: (1) acquisition, (2) relocation, (3) floodproofing, (4) flood warning, (5) flood insurance, and (6) channel maintenance. There are, at least 6 commercial/industrial establishments and 70 residences, either flooded or threatened by floodwater. Following is an assessment of the potential to protect these buildings, using nonstructural measures:

1. Acquisition. Acquisition would be recommended for properties in high-hazard zones. The high-hazard zone is the area nearest the creek where high-flood velocity and deep floodwater creates a serious danger to the lives of residents. Because of the risk to loss of life associated with these buildings, they should be purchased, removed from the floodplain, and the land used for other purposes. Federal funds are available for this type of situation through the FEMA "1362" program (Section 1362 of P.L. 90-448). However, the rules are limited to: 1) property particularly subject to flood damage, b) structure(s) covered by flood insurance, and c) structure(s) having incurred significant flood damage or repair of damage is prohibited by a local ordinance. This program calls for removal, or demolition, of the structure by the local community. The local governmental entity would receive title to the property with the understanding that future use would be limited to open space. Funding is limited.

   There may be high hazard areas, out of the floodway, that are currently undeveloped, but susceptible to development pressure. In such cases, acquisition is not the only remedy. A restrictive easement, which would allow the property owner to maintain the title, but restrict use in the hazardous area, may be a viable alternative. Within the area studied, there are few areas which would be considered high hazard. Flooding which occurs is mostly shallow (less than a foot deep) and/or having relatively low velocity of flow. Acquisition may be an alternative; however, it appears to have a low potential for implementation.

2. Relocation. Relocation is limited to buildings that could be moved a short distance to flood-free areas. Those are buildings that are near vacant lots and are structurally sound. This measure would probably cause opposition from landowners since they would be inconvenienced during the move; however, its cost is relatively low. This measure would have an average potential for implementation because of its low cost.

3. Floodproofing. Floodproofing consists of elevating existing buildings above the 100-year frequency flood by raising up the building and extending the height of the foundation and plumbing; sealing low openings and porous foundation walls; or intentionally flooding building basements to equalize hydrostatic pressures and prevent wall collapse.

Some of the residential and commercial buildings could be elevated above the 100-year frequency flood. These buildings are located in the low-hazard flood zone. The low-hazard zone is the area away from the creek where danger to loss of life is insignificant. Most would have to be elevated a height of one to two feet. Several residences could be protected in this way. Many of the buildings have the living area above ground level now, and raising would not be difficult. The buildings would still be isolated by floodwaters in the streets and yards. Floodproofing by raising floor levels may be acceptable to many landowners if proper landscaping is accomplished to avoid water flow and ponding under the building. Most residents would have to leave their homes for a period of two to three weeks during construction activities. Although this may be generally acceptable, some persons may not regard leaving their homes very favorably. It is judged that elevation of structures would have an average to high potential for implementation.

Sealing low openings could be used to protect some of the commercial buildings and may be applicable to some residences. Sealing would consist of placing flood shields over low openings and coating masonry walls with an impermeable material. Since few of the buildings have basements, the implementation has low potential. Intentional flooding of basements is not a potential solution in this watershed.

4. Flood Warning. A flood-warning system normally consists of National Weather Service (NWS) weather monitoring, a recording gage to monitor runoff, a flood watch, a flood warning system and an evacuation plan. The limiting factor in a flood-warning system for the Sheridan flood hazard area is the warning time available. Warning time is a product of the hydrologic and hydraulic characteristics of the drainage area upstream from the flood hazard area. Maximum anticipated warning time is from 1/2 to 1 hour. Because of the limited warning time, a flood-warning system for this area has a low potential for reducing flood damages, but provides time for local residents to reach safety in very hazardous situations.

   A flood-warning system is available for the South Yamhill River through NWS. There are raingages and streamgages upstream on the tributaries to monitor the storm conditions. This would benefit the areas of Sheridan along the river, but not this study area.

5. Flood Insurance. Yamhill County is participating in the Flood Insurance Program. Hydraulic data developed during this current study should be sufficient for use in updating insurance rates and management regulations for the flood insurance program.

   Flood insurance will reimburse owners for some of the flood damage losses they sustain, while associated management regulations guide future improvements to avoid developments that would be flood prone. Flood insurance, with a good educational program to acquaint local landowners with its advantages, would continue to have a high potential for implementation.

6. Channel Maintenance. A scheduled, systematic program of channel and streamside maintenance could assure the maximum capacity of the channel during flood times. Maintenance would include cleaning debris, dead overhanging trees, shopping carts, trash, and other items from the stream which would cause blockages to flood flows. This program would assure the present or design capacity of the channels would be available during a flood, but it would not increase the water carrying capability of the channel. It would be a relatively low-cost measure, but would require an annual, continuing expense. If channel enlargement is done as a structural measure, annual maintenance would be required to assure the proper functioning of the new channel. This alternative would have a good chance of implementation based upon its moderate cost.

Structural Measures

Structural measures considered to provide flood protection along this tributary in Sheridan include: (1) channel enlargement; (2) a floodway diversion; (3) a floodwater retarding dam; (4) new, enlarged Bridge St. culvert; and (5) a by-pass, outlet channel. Each of these were studied to determine the effects of the measure. Combinations of measures were also evaluated. A preliminary construction cost estimate was made for each measure.

Following is a description of each measure with effects and cost. The effects are for each measure alone without any combined measures. Figure 2 shows the location of each potential measure.

1. Channel Enlargement

Description - The channel from outlet of Bridge Street culvert to Route 18 culvert, closely following the present alignment, would be enlarged and deepened. Approximate size of the channel would be 5 feet deep with a 6-foot bottom width with 2:1 side slopes. Low dikes may be needed in some portions. The extent and height of the dikes would be determined by the degree of protection to be provided and effects of any upstream measures. Minimum channel would protect from the 50-year flood, with dikes providing 100-year protection. Channel would be excavated, shaped, and banks seeded to grasses and legumes. Some cleanout under the bridge and downstream a short distance would be included.

Effect - Channel would control flooding east of Bridge Street between the Southern Pacific Railroad and Route 18. Some overbank flooding would still be probable above the Route 18 culvert, and flood depth and frequency would be increased downstream of Route 18.

Cost: $30,000 (plus land rights costs)

2. Floodway Diversion

Description - A diversion approximately 800 feet upstream of Route 18 into a floodway which would cross agricultural land to the east and go to the next drainageway near Greencrest Memorial Park. A wide, shallow channel would divert flow only during periods of flood flows. Normal flows would follow the present channel. The floodway would be 3600 feet long.


SHERIDAN
SOUTH YAMHILL RIVER
BRIDGE STREET
S.P.R.R.
SHERIDAN ROAD
BY-PASS OUTLET
CHANNEL ENLARGE
DAM
CULVERT
RT. 18
FLOODWAY
N
FIGURE 2
CITY OF SHERIDAN
ALTERNATIVE MEASURES
SCALE 1" = 660'

Effect - Reduce frequency and depth of flooding at Bridge Street. Overflow of the culvert would begin with the 10-year flood rather than 5-year flood. Maximum depth of the 100-year flood would be reduced from 0.6 foot to 0.2 foot. Properties along Bridge Street and on the west side of the street would have less flooding. Below Bridge Street to where the tributaries join, the depth of flooding would be reduced, but frequency would not change. There would be increased flow in the receiving tributary. The area of the floodway could not be used for growing crops, but could be easily crossed except during flood periods. Land rights may be difficult to obtain for this type of measure.

Cost: $40,000 (plus land rights costs)

3. Floodwater Storage Dam

Description - A dam would be located between Bridge Street and Route 18 upstream of Sheridan. It would be about 30 feet high and control the 100-year flood. Outflow would be limited to the present capacity of the Bridge Street culvert. The reservoir behind the dam would be a "dry" pool with all the storage needed for flood protection. Maximum pool would be held below the elevation of the Route 18 culvert.

Effect - This would eliminate flooding caused by this tributary in the vicinity of Bridge Street, including the area northwest of the culvert. Downstream, there would be some change in frequency of flooding and considerable reduction in depth of flooding. The area of the dam and floodpool (about 10 acres) would be dedicated to that purpose and changed from present use as cropland and natural area.

Cost: $70,000 (plus land rights)

4. Culvert

Description - A new culvert under Bridge Street to handle the 100-year storm peak flow without flooding. It would be located about 400 feet south of the present culvert and would include a diversion channel for about 1000 feet, a culvert, and a drop structure to pass the floodflows to the downstream channel. The diversion would be located between the Route 18 interchange and the first building on the west side of Bridge Street, along the property line. On the east side of Bridge Street, it would curve to meet the present channel alignment. The channel and culvert would be able to carry the entire floodflow at that point, although a smaller culvert could be used if part of the flow was allowed to remain in the present channel and culvert. The present channel and culvert in the area cut off by the new channel should remain anyway to provide drainage for the local areas.

Effect - Flooding would be eliminated in the vicinity of Bridge Street. This would include both sides of the street and to the north. The area of the High School should have less flood problems.

Cost: $70,000 (plus land rights)

5. By-Pass Channel

Description - The by-pass includes culverts and channel beginning just above the Route 18 culvert and proceeding east near the Route 18 right-of-way to the South Yamhill River to contain the 100-year event. This would require culverts under the Southern Pacific Railroad and Sheridan Road along with abandoning the connector road (dirt) between Sheridan Road and Route 18. The by-pass would be about 2200 feet long. Channel portions would be approximately 8-foot bottom width and 7 feet deep with 3:1 side slopes.

Effect - This would provide flood protection and drainage for property north of the railroad and east of the Liberty Homes plant, which is not provided by any other components. It would also provide a better outlet for the channel upstream and eliminate flooding at the Route 18 bridge and downstream. Any higher flows induced by upstream channel enlargements or developments would be handled by this by-pass. Land rights to establish a new channel and cross a railroad and a highway may be difficult to obtain.

Cost: $165,000

Combinations of Measures

Each of the measures considered could be constructed and operated independent of the other measures. A more complete and satisfactory solution to the problems within the study area can be gained by a combination of measures. Several combinations were considered by the sponsors.

Alternative A

A Storage Dam and Channel Enlargement.

Effect - This would eliminate flooding caused by this tributary in the area of Bridge Street, south of Southern Pacific Railroad, and between the Railroad and Route 18. Flooding will also be eliminated downstream of Route 18. The dam and reservoir would require about 10 acres of land.

Cost:	Dam	$70,000
	Channel	30,000
	(plus landrights costs)	

Alternative B

A Floodway and Channel Enlargement.

Effect - Reduce frequency and depth of flooding at Bridge Street. Frequency of overflow would change from about a 5-year storm to a 10-year storm. Depth of the 100-year flood at Bridge Street culvert would be reduced from 0.6 foot to 0.2 foot. Most of the flooding would be eliminated between the Southern Pacific Railroad and Route 18. Some minor

flooding may remain just upstream of Route 18. Flooding will still occur west of Bridge Street and north to Harrison Street, and additional surface or subsurface drainage would be necessary to direct this overflow into the new channel and reduce flooding in the vicinity of the High School. The area of the floodway would be unusable when it is flowing, and the tributary receiving the floodway waters would experience higher flows than at present.

Cost:	Diversion	$40,000
	Channel	30,000
	(plus land rights)	

Alternative C

A New Culvert and Channel Enlargement.

Effect - Flooding would be eliminated from the point of diversion to Route 18. All floods to a 100-year would be contained in the channel at Bridge Street and below, as well as between the railroad and Route 18. Downstream of Route 18, there would be some increase in flooding. There would be some overbank flooding at the Route 18 culvert.

Cost:	Culvert (w/diversion)	$70,000
	Channel	30,000
	(plus land rights)	

Alternative D

A New Culvert, Channel Enlargement, and a By-Pass Channel

Effect - This is the most comprehensive of the alternatives and would solve many of the flood problems. It would provide the same protection (100-year) as Alternative C at Bridge Street and below while giving added protection to the area near the railroad, Route 18, and northeast of Route 18. There would be elimination of flooding along the present channel below Route 18.

Cost:	Culvert	$ 70,000
	Channel	30,000
	By-Pass	165,000
		265,000

USDA PROGRAMS

There are several USDA program opportunities which could aid in evaluating and implementing the project measures discussed in the prior sections of this report. Project action is available through conservation operations, group planning, special projects, resource conservation and development (RC&D), and the watershed protection (PL-566) program. Each of these programs would evaluate needs and problems more fully, determine viable solutions with costs and benefits, and determine potential federal cost sharing for implementing project measures. A strong local support is a key factor for getting federal support. Erosion and upstream flood problems in this creek coincide with the high priority objectives of the Soil Conservation Service.

The purpose of the Resource Conservation and Development (RC&D) program is to accelerate the conservation, development, and utilization of natural resources to improve the general level of economic activity, and to enhance the environment and standard of living in authorized RC&D areas. Authorized areas are locally sponsored areas designated by the Secretary of Agriculture for RC&D technical and financial assistance program funds. The Secretary of Agriculture, through authorities delegated to SCS and other USDA agencies, makes available to states, local units of government, and local nonprofit organizations, planning, design, and cost share assistance necessary to operate and maintain an RC&D area. Yamhill County is in the Northwest Oregon RC&D project area.

The Watershed Protection and Flood Prevention Act, Public Law 83-566, Stat. 666, authorizes "the Secretary of Agriculture to cooperate with states and local agencies in the planning and carrying out of works of improvement for soil conservation and for other purposes." It provides for technical, financial, and credit assistance by the Department to local organizations representing the people living in small watersheds. It also provides for needed additional treatment and protection of federally-owned lands within such watersheds. Moreover, the Act provides for a project-type approach to solving land, water, and related resource problems. It requires that full initiative and maximum responsibility for any undertaking be exercised by local people through their local organizations.

PREFERRED SOLUTION AND IMPLEMENTATION

A full review of the alternative solutions was made by the sponsors. Alternative D has been determined to be the preferred one. This combination of culvert, channel enlargement, and by-pass channel is the most comprehensive and gives the most complete protection of any of the proposals.

The RC&D program appears to have the best potential for providing USDA assistance in implementing this alternative. The extent which USDA could assist in construction will be determined by an economic analysis. This economic analysis and an environmental assessment will be accomplished in the RC&D planning. An RC&D measure plan is being prepared for this project.

INVESTIGATIONS AND ANALYSES

Surveys and Mapping

The City of Sheridan contracted with Chickering-Green Empire, Inc., to provide a two-foot contour interval topographic map of the main study area. This mapping was achieved using photogrammetric methods. Valley cross-sections were also tabulated by photogrammetric means. Channel dimensions and bridge/culvert data were obtained by field surveys. Seventeen cross-sections and three culverts were surveyed.

Hydrologic Analyses

A watershed analysis was made to develop data to floodroute through the watershed. The procedure and computer program in TR-20, "Computer Program for Project Formulation - Hydrology," was used to determine flood peak flows. These flood routings developed flood peaks from 10-year to 100-year frequency storms.

Twelve stream gages were investigated for use in a regional discharge-frequency analysis. These gages represent the gages in the vicinity of this study with drainage areas ranging from 0.57 to 27.4 square miles. The gages are listed in Table 1.

Discharge vs. frequency relationship was developed for each gage using the Log-Pearson Type 3 statistical procedure, as described in Bulletin 17B Guidelines for Determining Flood Flow Frequency (Editorial correction March 1982) of the Interagency Advisory Committee on Water Data. Regression equations of peak discharge vs. drainage area were developed for several frequencies of storm using the discharge vs. frequency of the 11 gages.

The gages showed a high coefficient of determination (r^2) of approximately 0.90 for each frequency. The discharge vs. drainage area equation for the 100-year storm computer to be $q=157.9\ (A)^{1.08}$.

Discharge-frequency relationships, as determined by the two methods, were compared. The TR-20 routing resulted in higher flows for all frequencies. The floodrouting considers more of the effect of watershed configuration and timing of peak flows. After reviewing these considerations, it was decided that the higher TR-20 routed values would be used, giving a conservative approach. The discharges by frequency, which were used, are listed in Table 2.

TABLE 1

STREAMGAGE RECORDS

SHERIDAN FPMS

Gage No.	Name	Drainage	No.Yrs.
141741	Cox Cr. at Albany	15.2	16
141901	Little Luckiamute R. nr Falls City	22.7	20
141902	Waymire Cr. nr. Falls City	3.46	15
141906	Soap Cr. Tributary nr. Suver	0.57	23
141907	Rickreall Cr. nr. Dallas	27.4	26
141921	Glenn Cr. nr. Salem	2.72	25
141922	Gibson Cr. nr. Salem	4.83	15
141928	S. Yamhill R. Tributary nr. Willamina	1.81	27
141933	Mill Cr. nr. Willamina	27.4	16
141943	N. Yamhill R. nr. Fairdale	9.03	16
141973	Panther Cr. nr. Carlton	3.19	16
143029	Nestucca R. nr. Fairdale	6.18	23

TABLE 2

DISCHARGE FREQUENCY DATA

SHERIDAN FPMS

Cross Section No.		Discharge (cfs) by Frequency			
From	To	10-yr	25-yr	100-yr	500-yr
10	12	630	731	925	1202
14	36	211	246	311	404
28	46	200	233	295	384

Hydraulic Analysis

Starting elevations for the profiles were determined using Manning's formula with the channel slope computed from the two most downstream cross sections. The South Yamhill River flooding should not affect these flood elevations.

Water surface profiles were developed using SCS Technical Release No. 61, "WSP-2 Computer Program." This program uses the standard step method for running backwater curves and BPR "Hydraulics of Bridge Waterways" procedures for bridges. Field survey data was used in this program. Roughness coefficients (N-values) were determined by field observation and reflect the conditions in 1986. Channel conditions for much of the area were light brush with thick annual species. Changes in the roughness condition, particularly permitting debris or brush to accumulate on clean banks, could change the flood elevations.

Channel velocity and elevation at each cross section for the 10-, 25-, 100-, and 500-year flood events were determined from the WSP-2 program. Depth of flow in the channel averages less than five feet with the average velocity about 3.0 fps.

Flood flows overtop the channel banks at the Bridge Street culvert and also below the culvert in the first 1000 feet of channel. The overflow flows to the east, away from the channel toward the Liberty Homes property. Most of it goes between the Liberty Homes factories and the railroad before returning to the channel at the junction of the railroad and Route 18. Separate water surface profiles were computed for the overflow discharges. Flood elevations at selected cross sections are given on Table 3 for each frequency storm evaluated. Locations of these cross sections are shown on Figure 3.

The area inundated by the 100-year flood was located on the topographic map using the cross section locations and data. Extent of flooding between sections was interpolated based upon the map. Floodlines were not checked with field survey methods.

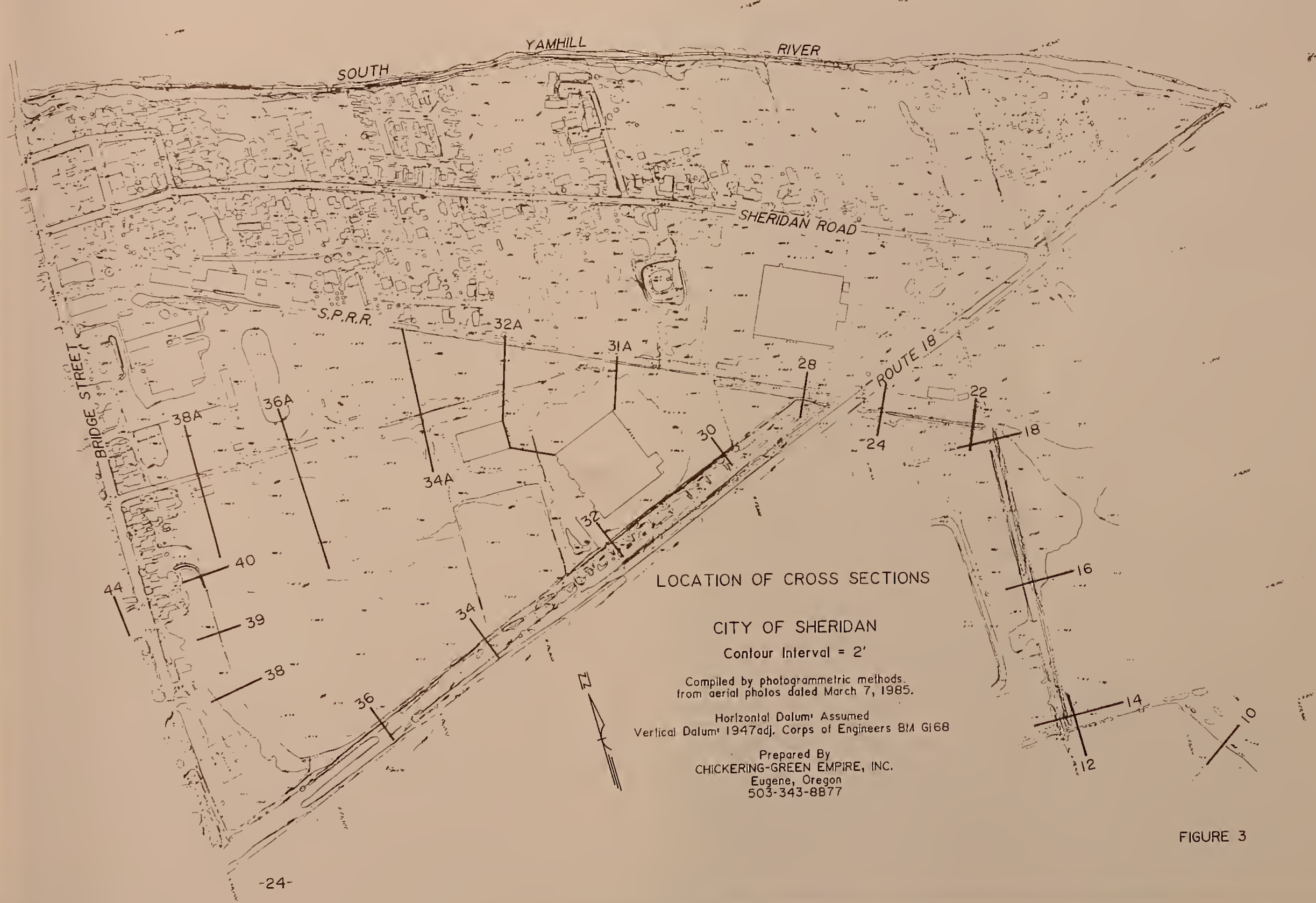
The alternatives were evaluated using the TR-20 and WSP-2 programs.

TABLE 3

FLOOD ELEVATIONS

SHERIDAN FPMS

Section No.	10-Yr.	25-Yr.	100-Yr.	500-Yr.
S-10	176.9	177.2	177.7	178.1
S-12	180.6	180.7	181.0	181.4
S-14	180.9	181.0	181.3	181.7
S-18	182.3	182.5	182.7	183.0
S-22	182.9	183.0	183.2	183.4
S-24	183.9	184.0	184.4	184.7
S-28	184.6	184.9	185.3	185.6
S-30	185.0	185.2	185.5	185.8
S-34	189.1	189.2	189.3	189.5
S-38	189.8	189.9	190.0	190.2
S-40	190.4	190.5	190.6	190.7
S-44	193.0	193.2	193.6	194.1
S-32A	186.3	186.5	186.6	186.8
S-34A	186.7	186.9	187.0	187.2
S-38A	189.1	189.2	189.3	189.4



LOCATION OF CROSS SECTIONS

CITY OF SHERIDAN

Contour Interval = 2'

Compiled by photogrammetric methods.
from aerial photos daled March 7, 1985.

Horizontal Datum: Assumed
Vertical Datum: 1947adj. Corps of Engineers BM G168

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FIGURE 3